higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

ENGINEERING SYSTEMS
NQF LEVEL 2

15 November 2024

This marking guideline consists of 6 pages.

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QUESTION 1

1.1 An Engineering system is a set of components ✓ that works together as a mechanism to perform a function. ✓ (2)

1.2 Input
Process
Output (3)

1.3 Lever
Gear drives
Hydraulic Systems
Wheels and axles
Pulleys
Wedges
Screws
Inclined plane (Any 5 × 1) (5)
[10]

QUESTION 2

2.1 F
2.2 G
2.3 J
2.4 H
2.5 I
2.6 B
2.7 C
2.8 A
2.9 D
2.10 E

(10 × 1) (10)
[10]

QUESTION 3

3.1.1 A Reservoir / Tank
B Pump/Hydraulic pump
C 4/3-way directional control valve or directional control valve
D Double acting cylinder or Piston (4)

3.1.2 The filter filtrates the Hydraulic oil
The filter cleans the Hydraulic oil
Removes impurities (Any 1 × 1) (1)

3.1.3 To avoid corrosion in pipes, hoses and other components
To keep operating system effective
To avoid build-up water in the reservoir
To protect the systems components (Any 2 × 1) (2)

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3.2	Check that the manufactures specifications are adhered to Check for noise and vibration Check for leakages Check for incorrect mounting, fitting, joining Check level of fluids Check belt tensions All safety guards must be in place	(Any 5 × 1)	(5)
3.3	Stay alert Ensure that the system is isolated/locked out before repairing Correct PPE must be worn Do not operate the system/machine if you are not trained Do not operate any engineering system when you are tired Do not use faulty machines Keep the working arear clean at all time Use machines as per work/manufactures instructions Never work without permission	(Any 5 × 1)	(5)
3.4	Warranty terms Safety precautions Operating procedure Service frequency Drawings of the machine Part numbers	(Any 3 × 1)	(3) **[20]**

QUESTION 4

4.1	Pulley B Clockwise Pulley C Clockwise Pulley D Clockwise		(3)
4.2	V-belt V- ribbed belt Notched belt drive / tooth belt Flat belt Round belt Link belt	(Any 3 × 1)	(3)
4.3.1	$D_A \times N_A = D_B \times N_B$ $180 \times 14.2 = D_B \times 19.6$ ✓ $D_B = 130.408$ *mm* ✓		(2)
4.3.2	$N_B = N_C =$ 19.6 *r/s* ✓		(1)
4.3.3	$D_C \times N_C = D_D \times N_D$ $160 \times 19.6 = 90 \times N_D$ ✓ $N_D = 34.844$ *r/s* ✓		(2)

4.4 Tension the belt according to specification
Follow service intervals
Check pulleys for correct alignment
Never overload the system
Keep guards in place (Any 3 × 1) (3)

4.5 Slip can take place and directly influence efficiency
Belt cannot be repaired if they break
They cannot work in adverse conditions
They can stretch and became slack (Any 3 × 1) (3)

4.6 Belt tension
Wedge angle
Material from which the belt and the pulley are made
The load on the belt (Any 3 × 1) (3)
[20]

QUESTION 5

5.1.1 Central Processing Unit

5.1.2 Alternative Current

5.1.3 Velocity Ratio (3 × 1) (3)

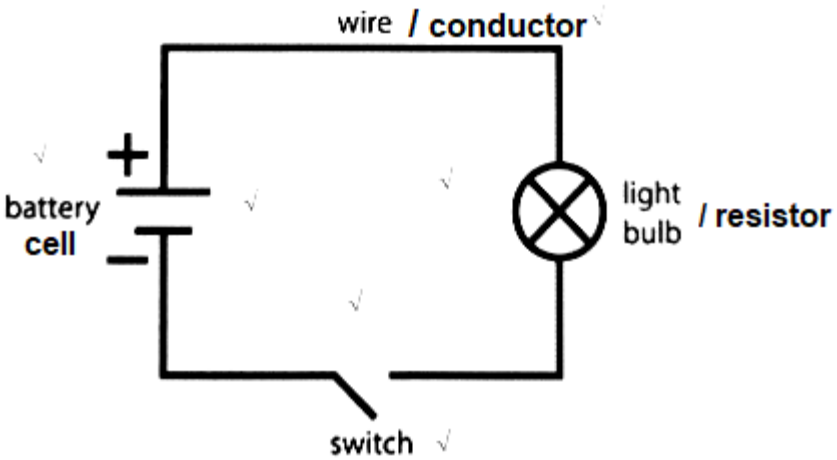
5.2

Earth	Yellow or green
Neutral	Brown
Live	Blue

(3 × 1) (3)

5.3 Fuses
Circuit breaker
Earth leakage unit (Any 2 × 1) (2)

5.4



mark for each component √
half a mark for each labelling √
1 full mark for correct connection (5)

5.5	Cross-sectional area Length Resistivity Temperature	(Any 2 × 1)	(2)
			[15]

QUESTION 6

6.1.1	Bearing Bush	(2 × 1)	(2)
6.1.2	Spur gear Helical gear Bevel gear Worm gear	(Any 3 × 1)	(3)
6.1.3	Check for Oil leaks Check for correct Pulley alignment Ensure Bolts and nuts are tight Ensure that there is no end play on the shaft Check for excessive lubrication	(Any 3 × 1)	(3)
6.2.1	Key is used to lock gear onto the shaft to make rotation possible		
6.2.2	Flat washer is used to prevent bolt and nut from loosening	(2 × 1)	(2)
			[10]

QUESTION 7

7.1	Isolation prevents anyone from turning on the power source✓, preventing injury to workers.✓		(2)
7.2	Customer name Technician name Date of the item received Item serial number Description of fault	(Any 4 × 1)	(4)
7.3	Oil Grease Graphite Lard	(Any 3 × 1)	(3)

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7.4	To improve safety To improve accuracy and efficiency To reduce downtime To reduce excessive wear To ensure optimal working condition	(Any 3 × 1)	(3)
7.5	Greater safety Small risk Higher quality of work / goods produced Lower operating costs Longer machine life / operating durability Higher end value of products	(Any 3 × 1)	(3) **[15]**
		TOTAL:	**100**

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